

SEQUENCE LISTING

<110> Sorrentino, Brian
Bunting, Kevin

<120> EXPANSION OF HEMATOPOIETIC STEM CELLS TRANSDUCED WITH
MDR-1 METHODS OF USE THEREOF

<130> 1340-1-021CIP

<140> UNASSIGNED

<141> 2000-05-31

<150> US 60/086,988

<151> 1998-05-28

<150> PCT/US99/11825

<151> 1999-05-27

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<170> PatentIn Ver. 2.0

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Ala Thr Thr Ile Ala Glu Asn Ile Arg Tyr Gly Arg Glu Asn Val Thr
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Met Asp Glu Ile Glu Lys Ala Val Lys Glu Ala Asn Ala Tyr Asp Phe
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Ile Met Lys Leu Pro His Lys Phe Asp Thr Leu Val Gly Glu Arg Gly
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Ala Gln Leu Ser Gly Gly Gln Lys Gln Arg Ile Ala Ile Ala Arg Ala
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Leu Val Arg Asn Pro Lys Ile Leu Leu Leu Asp Glu Ala Thr Ser Ala
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Leu Asp Thr Glu Ser Glu Ala Val Val Gln Val Ala Leu Asp Lys Ala
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Arg Lys Gly Arg Thr Thr Ile Val Ile Ala His Arg Leu Ser Thr Val
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Arg Asn Ala Asp Val Ile Ala Gly Phe Asp Asp Gly Val Ile Val Glu
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Lys Gly Asn His Asp Glu Leu Met Lys Glu Lys Gly Ile Tyr Phe Lys
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Leu Thr Glu Trp Pro Tyr Phe Val Val Gly Val Phe Cys Ala Ile Ile
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Asn Gly Gly Leu Gln Pro Ala Phe Ala Ile Ile Phe Ser Lys Ile Ile
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Gly Val Phe Thr Arg Ile Asp Asp Pro Glu Thr Lys Arg Gln Asn Ser
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Asn Leu Phe Ser Leu Leu Phe Leu Ala Leu Gly Ile Ile Ser Phe Ile
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Thr Phe Phe Leu Gln Gly Phe Thr Phe Gly Lys Ala Gly Glu Ile Leu
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Val Ser Trp Phe Asp Asp Pro Lys Asn Thr Thr Gly Ala Leu Thr Thr
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Leu Ala Val Ile Thr Gln Asn Ile Ala Asn Leu Gly Thr Gly Ile Ile
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Arg Asn Ser Leu Arg Lys Ala His Ile Phe Gly Ile Thr Phe Ser Phe
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Thr Gln Ala Met Met Tyr Phe Ser Tyr Ala Gly Cys Phe Arg Phe Gly
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Ala Tyr Leu Val Ala His Lys Leu Met Ser Phe Glu Asp Val Leu Leu
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Val Phe Ser Ala Val Val Phe Gly Ala Met Ala Val Gly Gln Val Ser
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Ser Phe Ala Pro Asp Tyr Ala Lys Ala Lys Ile Ser Ala Ala His Ile
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Ile Met Ile Ile Glu Lys Thr Pro Leu Ile Asp Ser Tyr Ser Thr Glu
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Gly Leu Met Pro Asn Thr Leu Glu Gly Asn Val Thr Phe Gly Glu Val
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Cys Met Ile Leu Gly Thr Leu Ala Ala Ile Ile His Gly Thr Leu Leu
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Pro Leu Leu Met Leu Val Phe Gly Asn Met Thr Asp Ser Phe Thr Lys
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Ser Thr Leu Ile Ile Ser Asn Ser Ser Leu Glu Glu Glu Met Ala Ile
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Tyr Ala Tyr Tyr Tyr Thr Gly Ile Gly Ala Gly Val Leu Ile Val Ala
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Tyr Ile Gln Val Ser Leu Trp Cys Leu Ala Ala Gly Arg Gln Ile His
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Lys Ile Arg Gln Lys Phe Phe His Ala Ile Met Asn Gln Glu Ile Gly
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Trp Phe Asp Val His Asp Val Gly Glu Leu Asn Thr Arg Leu Thr Asp
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Lys Lys Ala Ile Thr Ala Ser Ile Ser Ile Gly Ile Ala Tyr Leu Leu		
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Val Tyr Ala Ser Tyr Ala Leu Ala Phe Trp Tyr Gly Thr Ser Leu Val		
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Asp Asn Glu Pro Ser Ile Asp Ser Phe Ser Thr Lys Gly Tyr Lys Pro		
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Ser Lys Ser Pro Leu Ile Arg Arg Ser Ile Tyr Arg Ser Val His Arg			
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Lys Gln Asp Gln Glu Arg Arg Leu Ser Met Lys Glu Ala Val Asp Glu			
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Asp Val Pro Leu Val Ser Phe Trp Arg Ile Leu Asn Leu Asn Leu Ser			
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Glu Trp Pro Tyr Leu Leu Val Gly Val Leu Cys Ala Val Ile Asn Gly			
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Cys Ile Gln Pro Val Phe Ala Ile Val Phe Ser Arg Ile Val Gly Val			

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980

985

990

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Tyr Tyr Thr Gly Ile Gly Ala Gly Val Leu Ile Val Ala Tyr Ile Gln		
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Met Ala Thr Phe Phe Gly Gly Phe Ile Ile Gly Phe Thr Arg Gly Trp		
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Asp Glu Leu Met Arg Glu Lys Gly Ile Tyr Phe Lys Leu Val Met Thr		
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Lys Asp Glu Ile Asp Asn Leu Asp Met Ser Ser Lys Asp Ser Gly Ser		
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Gln Pro Ala Phe Ser Val Ile Phe Ser Lys Val Val Gly Val Phe Thr		
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Asn Gly Gly Pro Pro Glu Thr Gln Arg Gln Asn Ser Asn Leu Phe Ser		
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Tyr Gly Trp Gln Leu Thr Leu Leu Leu Leu Ala Ile Val Pro Ile Ile	850	855	860
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Thr Gln Gln Leu Met Thr Phe Glu Asn Val Leu Leu Val Phe Ser Ala	965	970	975
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Asp Tyr Ala Lys Ala Thr Val Ser Ala Ser His Ile Ile Arg Ile Ile	995	1000	1005
Glu Lys Thr Pro Glu Ile Asp Ser Tyr Ser Thr Gln Gly Leu Lys Pro	1010	1015	1020
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Phe Ile Asp Ser Leu Pro Asp Lys Tyr Asn Thr Arg Val Gly Asp Lys		
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	500		505	510
Leu Met Met Val Ala Tyr Ser Ala Ser Ser Met Ala Leu Ala Ile Ala				
	515		520	525
Ala Gly Gln Ser Val Val Ser Val Ala Thr Leu Leu Met Thr Ile Cys				
	530		535	540
Phe Val Phe Met Met Ile Phe Ser Gly Leu Leu Val Asn Leu Thr Thr				
545		550		555
Ile Ala Ser Trp Leu Ser Trp Leu Gln Tyr Phe Ser Ile Pro Arg Tyr				
	565		570	575
Gly Phe Thr Ala Leu Gln His Asn Glu Phe Leu Gly Gln Asn Phe Cys				
	580		585	590
Pro Gly Leu Asn Ala Thr Gly Asn Asn Pro Cys Asn Tyr Ala Thr Cys				
	595		600	605
Thr Gly Glu Glu Tyr Leu Val Lys Gln Gly Ile Asp Leu Ser Pro Trp				
	610		615	620
Gly Leu Trp Lys Asn His Val Ala Leu Ala Cys Met Ile Val Ile Phe				
625		630		635
Leu Thr Ile Ala Tyr Leu Lys Leu Leu Phe Leu Lys Lys Tyr Ser				
	645		650	655

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 <212> DNA
 <213> Mus musculus

 <220>

<221> CDS

<222> (1)..(444)

<400> 11

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Phe	Gly	Leu	Gly	Ala	Glu	Ala	Tyr	Thr	Ala	Ser	Ser	Met	Ala	Leu	Ala	
1				5					10					15		

ata	gcc	aca	ggc	caa	agt	gtg	gtg	tct	gta	gca	aca	cta	ctc	atg	aca	96
Ile	Ala	Thr	Gly	Gln	Ser	Val	Val	Ser	Val	Ala	Thr	Leu	Leu	Met	Thr	
			20					25						30		

atc	gct	ttt	gta	ttt	atg	atg	ctc	ttt	tct	ggc	ctc	ttg	gtg	aat	ctc	144
Ile	Ala	Phe	Val	Phe	Met	Met	Leu	Phe	Ser	Gly	Leu	Leu	Val	Asn	Leu	
			35				40						45			

aga	acc	att	ggg	cct	tgg	ctg	tcc	tgg	ctt	cag	tac	ttt	agc	att	cct	192
Arg	Thr	Ile	Gly	Pro	Trp	Leu	Ser	Trp	Leu	Gln	Tyr	Phe	Ser	Ile	Pro	
	50					55					60					

cga	tat	ggc	ttc	aca	gct	ttg	cag	tat	aat	gaa	ttc	ttg	gga	caa	gag	240
Arg	Tyr	Gly	Phe	Thr	Ala	Leu	Gln	Tyr	Asn	Glu	Phe	Leu	Gly	Gln	Glu	
	65				70					75					80	

ttc	tgt	cca	gga	ttc	aat	gta	acg	gac	aac	agc	act	tgt	gtt	aac	agc	288
Phe	Cys	Pro	Gly	Phe	Asn	Val	Thr	Asp	Asn	Ser	Thr	Cys	Val	Asn	Ser	
				85					90					95		

tat	gca	ata	tgt	act	ggg	aac	gag	tac	ttg	ata	aat	cag	ggc	atc	gaa	336
Tyr	Ala	Ile	Cys	Thr	Gly	Asn	Glu	Tyr	Leu	Ile	Asn	Gln	Gly	Ile	Glu	
			100					105					110			

ctg	tca	cct	tgg	gga	ctg	tgg	aag	aat	cat	gtg	gcc	ctg	gct	tgt	atg	384
Leu	Ser	Pro	Trp	Gly	Leu	Trp	Lys	Asn	His	Val	Ala	Leu	Ala	Cys	Met	
		115					120					125				

att	att	atc	ttc	ctc	aca	att	gcc	tac	ctg	aaa	ttg	ttg	ttt	ctt	aaa	432
Ile	Ile	Ile	Phe	Leu	Thr	Ile	Ala	Tyr	Leu	Lys	Leu	Ile	Phe	Leu	Lys	
	130					135					140					

aag	tat	tct	taa	tttcccccttt	aacgggactat	taattgtact	ccaattaaat	484
Lys	Tyr	Ser						
	145							

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<211> 147
 <212> PRT
 <213> Mus musculus

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 Ile Ala Thr Gly Gln Ser Val Val Ser Val Ala Thr Leu Leu Met Thr
 20 25 30
 Ile Ala Phe Val Phe Met Met Leu Phe Ser Gly Leu Leu Val Asn Leu
 35 40 45
 Arg Thr Ile Gly Pro Trp Leu Ser Trp Leu Gln Tyr Phe Ser Ile Pro
 50 55 60
 Arg Tyr Gly Phe Thr Ala Leu Gln Tyr Asn Glu Phe Leu Gly Gln Glu
 65 70 75 80
 Phe Cys Pro Gly Phe Asn Val Thr Asp Asn Ser Thr Cys Val Asn Ser
 85 90 95
 Tyr Ala Ile Cys Thr Gly Asn Glu Tyr Leu Ile Asn Gln Gly Ile Glu
 100 105 110
 Leu Ser Pro Trp Gly Leu Trp Lys Asn His Val Ala Leu Ala Cys Met
 115 120 125
 Ile Ile Ile Phe Leu Thr Ile Ala Tyr Leu Lys Leu Leu Phe Leu Lys
 130 135 140
 Lys Tyr Ser
 145

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 <211> 2125
 <212> DNA
 <213> Mus musculus

<220>
 <221> CDS
 <222> (20)..(1993)

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atg	tcg	cag	aga	aac	aac	aac	ggc	ctt	cct	agg	atg	aac	tcc	aga	gcc	100																																
Met	Ser	Gln	Arg	Asn	Asn	Asn	Gly	Leu	Pro	Arg	Met	Asn	Ser	Arg	Ala																																	
			15						20						25																																	
gtt	agg	acg	ctc	gca	gaa	gga	gat	gtg	ttg	agt	ttt	cat	cac	atc	acc	148																																
Val	Arg	Thr	Leu	Ala	Glu	Gly	Asp	Val	Leu	Ser	Phe	His	His	Ile	Thr																																	
			30						35						40																																	
tat	cga	gtg	aaa	gta	aag	agt	ggg	ttt	cta	gtc	cgg	aaa	aca	gtt	gag	196																																
Tyr	Arg	Val	Lys	Val	Lys	Ser	Gly	Phe	Leu	Val	Arg	Lys	Thr	Val	Glu																																	
			45						50						55																																	
aaa	gaa	ata	cta	tca	gat	atc	aat	ggg	atc	atg	aaa	cct	ggc	ctt	aat	244																																
Lys	Glu	Ile	Leu	Ser	Asp	Ile	Asn	Gly	Ile	Met	Lys	Pro	Gly	Leu	Asn																																	
			60						65						70																																	
gct	att	ctg	gga	ccc	aca	ggc	gga	ggc	aag	tct	tcg	ttg	cta	gat	gtc	292																																
Ala	Ile	Leu	Gly	Pro	Thr	Gly	Gly	Gly	Lys	Ser	Ser	Leu	Leu	Asp	Val																																	
			80						85						90																																	
tta	gca	gca	agg	aaa	gat	cca	aag	gga	tta	tct	gga	gat	gtt	ttg	ata	340																																
Leu	Ala	Ala	Arg	Lys	Asp	Pro	Lys	Gly	Leu	Ser	Gly	Asp	Val	Leu	Ile																																	
			95						100						105																																	
aat	gga	gca	cct	caa	cct	gcc	cat	ttc	aaa	tgc	tgt	tca	ggg	tat	gtg	388																																
Asn	Gly	Ala	Pro	Gln	Pro	Ala	His	Phe	Lys	Cys	Cys	Ser	Gly	Tyr	Val																																	
			110						115						120																																	
gtt	caa	gat	gac	gtt	gtg	atg	ggc	acc	ctg	aca	gtg	aga	gaa	aac	tta	436																																
Val	Gln	Asp	Asp	Val	Val	Met	Gly	Thr	Leu	Thr	Val	Arg	Glu	Asn	Leu																																	
			125						130						135																																	
cag	ttc	tca	gca	gct	ctt	cga	ctt	cca	aca	act	atg	aag	aat	cat	gaa	484																																
Gln	Phe	Ser	Ala	Ala	Leu	Arg	Leu	Pro	Thr	Thr	Met	Lys	Asn	His	Glu																																	
			140						145						150																																	
aaa	aat	gaa	cgg	att	aac	aca	atc	att	aaa	gag	tta	ggg	ctg	gaa	aaa	532																																
Lys	Asn	Glu	Arg	Ile	Asn	Thr	Ile	Ile	Lys	Glu	Leu	Gly	Leu	Glu	Lys																																	
			160						165						170																																	
gta	gca	gat	tct	aag	gtc	gga	act	cag	ttt	atc	cgt	ggc	atc	tct	gga	580																																
Val	Ala	Asp	Ser	Lys	Val	Gly	Thr	Gln	Phe	Ile	Arg	Gly	Ile	Ser	Gly																																	
			175						180						185																																	
gga	gaa	aga	aaa	agg	aca	agc	ata	ggg	atg	gag	ctg	atc	act	gac	cct	628																																
Gly	Glu	Arg	Lys	Arg	Thr	Ser	Ile	Gly	Met	Glu	Leu	Ile	Thr	Asp	Pro																																	

190	195	200	
tcc atc ctc ttc ctg gat gag ccc acg act ggt ttg gac tca agc aca			676
Ser Ile Leu Phe Leu Asp Glu Pro Thr Thr Gly Leu Asp Ser Ser Thr			
205	210	215	
gcg aat gct gtc ctt ttg ctc ctg aaa agg atg tct aaa cag ggt cga			724
Ala Asn Ala Val Leu Leu Leu Leu Lys Arg Met Ser Lys Gln Gly Arg			
220	225	230	235
aca atc atc ttc tcc att cat cag cct cgg tat tcc atc ttt aag ttg			772
Thr Ile Ile Phe Ser Ile His Gln Pro Arg Tyr Ser Ile Phe Lys Leu			
240	245	250	
ttt gac agc ctc acc tta ctg gct tcc ggg aaa ctc gtg ttc cat ggg			820
Phe Asp Ser Leu Thr Leu Leu Ala Ser Gly Lys Leu Val Phe His Gly			
255	260	265	
cca gca cag aag gcc ttg gag tac ttt gca tca gca ggt tac cac tgt			868
Pro Ala Gln Lys Ala Leu Glu Tyr Phe Ala Ser Ala Gly Tyr His Cys			
270	275	280	
gag ccc tac aac aac cct gcg gat ttt ttc ctt gat gtc atc aat gga			916
Glu Pro Tyr Asn Asn Pro Ala Asp Phe Phe Leu Asp Val Ile Asn Gly			
285	290	295	
gat tct tct gct gtg atg tta aat aga gag gaa caa gac aat gaa gca			964
Asp Ser Ser Ala Val Met Leu Asn Arg Glu Glu Gln Asp Asn Glu Ala			
300	305	310	315
aac aag act gaa gag cct tcc aag gga gag aag cca gta ata gaa aat			1012
Asn Lys Thr Glu Glu Pro Ser Lys Gly Glu Lys Pro Val Ile Glu Asn			
320	325	330	
tta tct gag ttt tat atc aac tct gcc atc tat gga gaa aca aaa gct			1060
Leu Ser Glu Phe Tyr Ile Asn Ser Ala Ile Tyr Gly Glu Thr Lys Ala			
335	340	345	
gaa tta gat caa ctt cca gga gct cag gaa aag aaa gga aca tgg gcc			1108
Glu Leu Asp Gln Leu Pro Gly Ala Gln Glu Lys Lys Gly Thr Ser Ala			
350	355	360	
ttc aaa gag cca gtc tat gtt acc tct ttc tgt cac cag ctc cga tgg			1156
Phe Lys Glu Pro Val Tyr Val Thr Ser Phe Cys His Gln Leu Arg Trp			
365	370	375	
att gcc agg cgc tca ttt aaa aac ttg ctc ggg aac cct caa gct tct			1204
Ile Ala Arg Arg Ser Phe Lys Asn Leu Leu Gly Asn Pro Gln Ala Ser			

380	385	390	395	
gtt gct cag tta att gtt aca gtc ata ctg ggg ctt att att ggt gcc				1252
Val Ala Gln Leu Ile Val Thr Val Ile Leu Gly Leu Ile Ile Gly Ala				
400		405	410	
att tac ttt gat ctg aaa tat gat gcc gct gga atg caa aat aga gct				1300
Ile Tyr Phe Asp Leu Lys Tyr Asp Ala Ala Gly Met Gln Asn Arg Ala				
415	420		425	
gga gtt ttg ttt ttc ctg act acc aac cag tgt ttt tcc agt gtg tca				1348
Gly Val Leu Phe Phe Leu Thr Thr Asn Gln Cys Phe Ser Ser Val Ser				
430	435		440	
gct gtg gag ctg ttc gta gtg gag aag aaa ctc ttc ata cat gag tac				1396
Ala Val Glu Leu Phe Val Val Glu Lys Lys Leu Phe Ile His Glu Tyr				
445	450		455	
atc agt gga tat tac aga gtg tct tct tac ttc ttt gga aag gtg atg				1444
Ile Ser Gly Tyr Tyr Arg Val Ser Ser Tyr Phe Phe Gly Lys Val Met				
460	465	470	475	
tct gat tta ctc ccc atg agg ttc ttg cca agt gtt ata ttc act tgt				1492
Ser Asp Leu Leu Pro Met Arg Phe Leu Pro Ser Val Ile Phe Thr Cys				
480	485		490	
ata tta tac ttc atg tta gga ctg aag aag acg gtg gat gct ttt ttc				1540
Ile Leu Tyr Phe Met Leu Gly Leu Lys Lys Thr Val Asp Ala Phe Phe				
495	500		505	
atc atg atg ttt acc ctt ata atg gtg gct tat acg gcc agt tcc atg				1588
Ile Met Met Phe Thr Leu Ile Met Val Ala Tyr Thr Ala Ser Ser Met				
510	515		520	
gca ctg gcc ata gcc aca gcc caa agt gtg gtg tct gta gca aca ctt				1636
Ala Leu Ala Ile Ala Thr Gly Gln Ser Val Val Ser Val Ala Thr Leu				
525	530		535	
ctc atg aca atc gct ttt gta ttt atg atg ctc ttt tct gcc ctc ttg				1684
Leu Met Thr Ile Ala Phe Val Phe Met Met Leu Phe Ser Gly Leu Leu				
540	545	550	555	
gtg aat ctc aga acc att ggg cct tgg ctg tcc tgg ctt cag tac ttt				1732
Val Asn Leu Arg Thr Ile Gly Pro Trp Leu Ser Trp Leu Gln Tyr Phe				
560	565		570	
agc att cct cga tat gcc ttc aca gct ttg cag tat aat gaa ttc ttg				1780
Ser Ile Pro Arg Tyr Gly Phe Thr Ala Leu Gln Tyr Asn Glu Phe Leu				

575

580

585

gga caa gag ttt tgt cca gga ttc aat gta acg gac aac agc act tgt 1828
 Gly Gln Glu Phe Cys Pro Gly Phe Asn Val Thr Asp Asn Ser Thr Cys
 590 595 600

gtt aac agc tat gca ata tgt act ggt aac gag tac ttg ata aat cag 1876
 Val Asn Ser Tyr Ala Ile Cys Thr Gly Asn Glu Tyr Leu Ile Asn Gln
 605 610 615

ggc atc gaa ctg tca cct tgg gga ctg tgg aag aat cat gtg gcc ctg 1924
 Gly Ile Glu Leu Ser Pro Trp Gly Leu Trp Lys Asn His Val Ala Leu
 620 625 630 635

gct tgt atg att att atc ttc ctc aca att gcc tac ctg aaa ttg ttg 1972
 Ala Cys Met Ile Ile Ile Phe Leu Thr Ile Ala Tyr Leu Lys Leu Leu
 640 645 650

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 Phe Leu Lys Lys Tyr Ser
 655

<210> 14

<211> 657

<212> PRT

<213> Mus musculus

<400> 14

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 20 25 30

Glu Gly Asp Val Leu Ser Phe His His Ile Thr Tyr Arg Val Lys Val
 35 40 45

Lys Ser Gly Phe Leu Val Arg Lys Thr Val Glu Lys Glu Ile Leu Ser
 50 55 60

Asp Ile Asn Gly Ile Met Lys Pro Gly Leu Asn Ala Ile Leu Gly Pro
 65 70 75 80

Thr Gly Gly Gly Lys Ser Ser Leu Leu Asp Val Leu Ala Ala Arg Lys
 85 90 95

Asp Pro Lys Gly Leu Ser Gly Asp Val Leu Ile Asn Gly Ala Pro Gln

100	105	110
Pro Ala His Phe Lys Cys Cys Ser Gly Tyr Val Val Gln Asp Asp Val		
115	120	125
Val Met Gly Thr Leu Thr Val Arg Glu Asn Leu Gln Phe Ser Ala Ala		
130	135	140
Leu Arg Leu Pro Thr Thr Met Lys Asn His Glu Lys Asn Glu Arg Ile		
145	150	155
Asn Thr Ile Ile Lys Glu Leu Gly Leu Glu Lys Val Ala Asp Ser Lys		
165	170	175
Val Gly Thr Gln Phe Ile Arg Gly Ile Ser Gly Gly Glu Arg Lys Arg		
180	185	190
Thr Ser Ile Gly Met Glu Leu Ile Thr Asp Pro Ser Ile Leu Phe Leu		
195	200	205
Asp Glu Pro Thr Thr Gly Leu Asp Ser Ser Thr Ala Asn Ala Val Leu		
210	215	220
Leu Leu Leu Lys Arg Met Ser Lys Gln Gly Arg Thr Ile Ile Phe Ser		
225	230	235
Ile His Gln Pro Arg Tyr Ser Ile Phe Lys Leu Phe Asp Ser Leu Thr		
245	250	255
Leu Leu Ala Ser Gly Lys Leu Val Phe His Gly Pro Ala Gln Lys Ala		
260	265	270
Leu Glu Tyr Phe Ala Ser Ala Gly Tyr His Cys Glu Pro Tyr Asn Asn		
275	280	285
Pro Ala Asp Phe Phe Leu Asp Val Ile Asn Gly Asp Ser Ser Ala Val		
290	295	300
Met Leu Asn Arg Glu Glu Gln Asp Asn Glu Ala Asn Lys Thr Glu Glu		
305	310	315
Pro Ser Lys Gly Glu Lys Pro Val Ile Glu Asn Leu Ser Glu Phe Tyr		
325	330	335
Ile Asn Ser Ala Ile Tyr Gly Glu Thr Lys Ala Glu Leu Asp Gln Leu		
340	345	350
Pro Gly Ala Gln Glu Lys Lys Gly Thr Ser Ala Phe Lys Glu Pro Val		

355		360		365
Tyr Val Thr Ser Phe Cys His Gln Leu Arg Trp Ile Ala Arg Arg Ser				
370		375		380
Phe Lys Asn Leu Leu Gly Asn Pro Gln Ala Ser Val Ala Gln Leu Ile				
385		390		395 400
Val Thr Val Ile Leu Gly Leu Ile Ile Gly Ala Ile Tyr Phe Asp Leu				
	405		410	415
Lys Tyr Asp Ala Ala Gly Met Gln Asn Arg Ala Gly Val Leu Phe Phe				
	420		425	430
Leu Thr Thr Asn Gln Cys Phe Ser Ser Val Ser Ala Val Glu Leu Phe				
	435		440	445
Val Val Glu Lys Lys Leu Phe Ile His Glu Tyr Ile Ser Gly Tyr Tyr				
	450		455	460
Arg Val Ser Ser Tyr Phe Phe Gly Lys Val Met Ser Asp Leu Leu Pro				
465		470		475 480
Met Arg Phe Leu Pro Ser Val Ile Phe Thr Cys Ile Leu Tyr Phe Met				
	485		490	495
Leu Gly Leu Lys Lys Thr Val Asp Ala Phe Phe Ile Met Met Phe Thr				
	500		505	510
Leu Ile Met Val Ala Tyr Thr Ala Ser Ser Met Ala Leu Ala Ile Ala				
	515		520	525
Thr Gly Gln Ser Val Val Ser Val Ala Thr Leu Leu Met Thr Ile Ala				
	530		535	540
Phe Val Phe Met Met Leu Phe Ser Gly Leu Leu Val Asn Leu Arg Thr				
545		550		555 560
Ile Gly Pro Trp Leu Ser Trp Leu Gln Tyr Phe Ser Ile Pro Arg Tyr				
	565		570	575
Gly Phe Thr Ala Leu Gln Tyr Asn Glu Phe Leu Gly Gln Glu Phe Cys				
	580		585	590
Pro Gly Phe Asn Val Thr Asp Asn Ser Thr Cys Val Asn Ser Tyr Ala				
	595		600	605
Ile Cys Thr Gly Asn Glu Tyr Leu Ile Asn Gln Gly Ile Glu Leu Ser				

610

615

620

Pro Trp Gly Leu Trp Lys Asn His Val Ala Leu Ala Cys Met Ile Ile
 625 630 635 640

Ile Phe Leu Thr Ile Ala Tyr Leu Lys Leu Leu Phe Leu Lys Lys Tyr
 645 650 655

Ser

<210> 15

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer.

<400> 15

ccacgtcagc cttggacaca

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<210> 16

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer.

<400> 16

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